

How Green Financial Instruments Mitigate Climate Risk: A Case Study of Build Your Dream's Green Bonds

Minjinghan Tu^{1,*}

¹St. George Campus, University of Toronto, Toronto, Canada

*Corresponding author: minjinghan.tu@mail.utoronto.ca

Abstract:

Climate change poses a significant risk to the global economy, including physical risks such as extreme weather and transition risks like carbon tariffs. The paper discusses Green financing, such as green bonds, as effective measures to address the risk associated with climate change through funding sustainable projects. This paper revolves around how Build Your Dream (BYD), a leading Chinese new energy vehicle company, leverages green bonds to mitigate climate risks. This study further analyzes BYD's climate exposure, details of its green bond issuance like "19 Yadi G1", and the mechanism through which these green bonds are set to reduce these risks. This research reveals that BYD suffers from physical risks at the production stage, and most of these risks result from changes in climate events and transition risks from carbon tariffs. Introduction factors such as low-carbon technologies, energy storage, and effective infrastructure have improved BYD's environmental performance, reducing financial cost and enhancing its market reputation. The Green bonds support low-carbon innovation, help it comply with carbon markets, and fund resilient infrastructure, ensuring its alignment with China's "Dual Carbon" goals (Carbon peak by 2030, neutrality by 2060). The research shows companies reacting positively to green bonds, as indicated by increased stock price and Environment Social and Governance (ESG) ratings for the certified bonds. The case study reflects how green bonds can manage climate risk while delivering financial and environmental benefits to the industry. The research recommends a stronger market in Canada and globally to support sustainable development.

Keywords: Green bonds; climate risk; BYD; low-carbon technology; sustainable finance.

1. Introduction

Climate change is a significant force in the industry that poses major global problems that contribute to negative impacts on economies due to physical risks, such as floods, heatwaves, and storms, as well as transition risks, such as stricter environmental regulations and carbon pricing. The Sixth Assessment Report by the Intergovernmental Panel on Climate Change states that global warming has increased by 1.10 °C since the pre-industrial period, leading to frequent extreme weather events disrupting global supply chains and Infrastructure [1]. These risks have hit the automotive manufacturing industry hard, increasing production and export market costs. For instance, according to Intergovernmental Panel on Climate Change (IPCC), the unmitigated climate risk is likely to significantly impact the global economy, between 10-20% of the global Gross Domestic Product (GDP) by 2050, as demonstrated by high emission scenarios. However, in response to these climatic challenges and risks, the market has responded with financial tools such as Green bonds, which have gained importance over time. As the name suggests, green bonds are the instruments of debt financing that fund environmentally friendly projects such as renewable energy and energy-efficient technologies. China has played a significant role in enhancing the global green bond market, making it the second largest issuer of Green bonds at \$68.2 billion around 2021 [2]. This statistic shows growth in the Green Bond by 187% in 2021, reflecting a global shift towards sustainable finance as a suitable tool for addressing climate risks.

Importantly, some academic research explores the role of green bonds as a useful tool in mitigating climate risks. Green bonds have improved Build Your Dream (BYD)'s

environmental performance by reducing carbon dioxide (CO₂) emissions [3]. In addition, the shift towards green bonds has also attracted more investors with a focus on the sustainable goals, leading to enhanced firms' market value [4]. Despite the positivity that comes with green bonds, there are still additional challenges of greenwashing where firms tend to overstate environmental benefits, resulting in stronger and stricter green bond regulation [5]. Canada falls among the countries with high growth in green bond usage and market application, with it only recording \$4.2 trillion in sustainable finance, including green bonds issued by mid-2023, which was deemed useful for the making process [6]. This paper incorporates BYD, a Chinese automotive conglomerate, as a case study to explore the usefulness of green bonds in addressing climate risks.

This study aims to analyse BYD's exposure to climate risk, to explore the details and impact of its green bond issuance, and to examine how green bonds mitigate climate risks through technological, regulatory, and infrastructural mechanisms.

The significance of this research lies in providing insights for Canadian firms and policymakers regarding the usefulness of green bonds in financing and achieving global sustainable goals. Therefore, by studying BYD, a leading Chinese automotive industry in innovation and energy vehicles, the paper offers practical lessons for Canada's automotive and energy sectors, ensuring its alignment with the global climate commitments like the Paris Agreement.

2. Overview of BYD's Green Bond Issuance

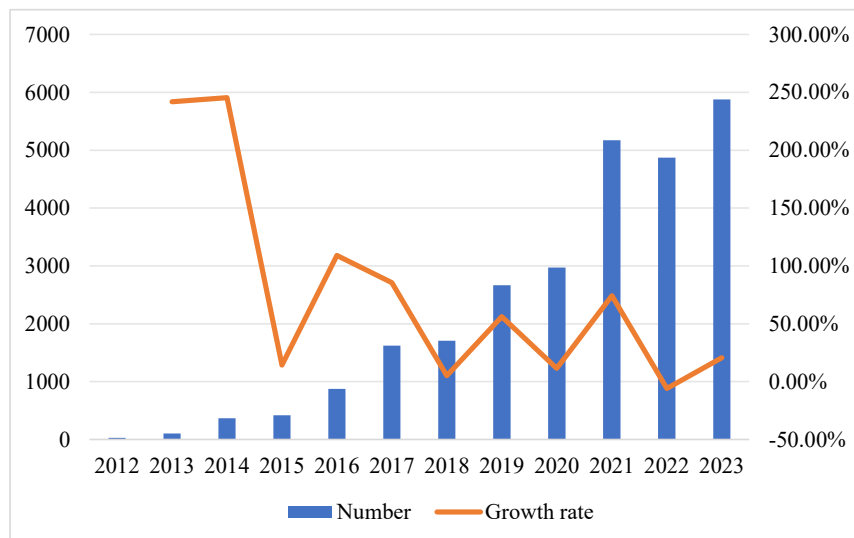


Fig. 1 The scale of global green bond issuance (USD:100M)

Figure 1 clearly presents the exponential growth trend of global green bond issuance scale from 2012 to 2023, with a compound annual growth rate of 24.6%. Under this trend, BYD has been expanding its issuance scale in sync with the global market since its debut of green bonds in 2017, perfectly aligning with the international low-carbon transformation process.

2.1 Analysis of BYD's Climate Risk Exposure

BYD Company Limited (BYD) is a global technology company founded in 1995 by Wang Chuanfu. The company specializes in developing new energy solutions, including electric vehicles, battery technology, and renewable energy. Though it started as a battery manufacturer, the company has expanded into a comprehensive provider of clean energy systems, offering a range of products from electric buses and cars to semiconductors and solar panels. BYD's main production facility is located in cities such as Shenzhen and Xi'an, exposing the company to physical climate risks such as floods and heatwaves. The report by the IPCC shows that China is increasingly facing extreme weather events, with coastlines like Shenzhen being vulnerable to sea-level rises and typhoons [1]. Most likely, the event within the coastline may disrupt manufacturing processes, damage equipment, and delay supply chains, leading to a higher operational cost. For instance 2020, China experienced industrial operation disruption due to flooding in the southern coastline, demonstrating the risk associated with BYD's production bases [7].

Besides the physical risks, BYD also faces export challenges to global markets: Europe and North America countries, leading to transition risk such as the European Union (EU) Carbon Border Adjustment Mechanism (CBAM) that entails imposing cost on carbon-intensive imports, resulting in increased expenses for automakers reliant on fossil fuel-based supply chains. Since BYD aims to expand globally, such trade tariffs could raise export costs, especially for vehicles that emit high carbon footprints [8]. Transition risks include stricter emission regulation policies aimed at investing in the automotive industry to make it cleaner and more competitive through energy-friendly technologies.

2.2 Green Bond Issuance Factors

BYD has provided green bonds, such as the "19 Yadi G1" bonds, aiming at funding sustainable projects, considering the following key factors: The "19 Yadi G1" bonds raised significant funds to support projects such as Lithium-ion battery production and photovoltaic energy. BYD's green bonds usually tend to have medium-term maturities like 5-7 years, a suitable range for balancing investors' returns with project timelines. Mostly, Bond proceeds are usual-

ly allocated to low-carbon technologies: electric vehicle batteries, energy storage facilities, and zero-carbon parks, ensuring their alignment with the China "Dual Carbon" goals [9]. Bonds usually get certified by third parties such as Climate Bonds Initiative to ensure the Bond's credibility and reduce greenwashing risks [10].

2.3 BYD's Market Reaction and Finance Cost

Over the years, BYD has reacted positively after issuing green bonds. This is demonstrated by the increasing stock price upon the green bond announcement, reflecting confidence in BYD's sustainability commitment [4]. For example, issuing "19 Yadi G1" led to a stock increase. Additionally, the certified issuance of certified bonds has attracted long-term and green investments, leading to a further decrease in financing cost, which is competitive enough compared to conventional bonds. Despite the positivity of the green bonds' effectiveness, they still face slightly higher issuance costs because of the bureaucracy in issuing certification and reporting requirements.

3. Analysis of Green Bonds' Climate Risk Mitigation Mechanism

3.1 Supporting Low-Carbon Technology Innovation

BYD's green bonds normally fund research and production of low-carbon technologies such as lithium-iron phosphate batteries and electric vehicles. Objectively, these innovations are meant to reduce emissions within the automotive sector, mitigating physical risk by reducing BYD's environmental footprint. For instance, between 2019 and 2022, BYD's "19 Yadi G1" bond was used to support battery advancement to reduce emissions by 10% when producing vehicles. This aligns with research on the importance of green bonds in improving environmental performance when linked to specific projects in the industry [3].

3.2 Developing Carbon Market Compliance

Indeed, green bonds are an essential tool that helps BYD align carbon market regulation and policies, hedging rising carbon prices in the market, ensuring its alignment with the emission caps set by China's National Carbon Trading Market introduced in 2021. By investing in low-carbon technologies supported by green bonds, BYD tends to reduce its carbon liability, which helps it avoid penalties while enhancing its competitiveness in the global market. Likewise, this approach often mitigates transition risk associated with carbon tariffs in the export markets because cleaner production reduces tariff costs [9].

3.3 Infrastructure Investment

Green bonds, as an innovative financial tool for BYD to promote climate adaptive infrastructure construction, have played a key role in implementing sustainable development strategies. Taking the “Zero Carbon Park” in Shenzhen, which was completed in 2021, as an example, the project has achieved 100% renewable energy supply through low-carbon technologies such as photovoltaic building integration and ground source heat pump energy storage system. This not only ensures stable power supply for the park in extreme high temperature weather in 2023, but also effectively alleviates the risk of waterlogging through coastal urban design. This benchmark project has significantly improved BYD’s ESG rating. Moody’s upgraded its main rating to Baa1 in 2022, driving the company’s green bond subscription multiple to exceed 4.5 times, attracting 12 international institutional investors including Blackstone and BlackRock to increase their investment [10].

4. Conclusion

In conclusion, this paper explores how BYD Co., Ltd utilises Green bonds to mitigate climate risks, emphasizing the company’s exposure to physical and transition risks, the details of its bond issuance, and the mechanism tailored towards reducing the associated risks. The research demonstrated some significant scenarios where the company faces physical risk from extreme weather at its production facilities and transition risks from carbon tariffs imposed on exportation activities. The company’s green bonds, such as “19 Yadi G1”, tend to sponsor low-carbon technologies, carbon market compliance, and resilience infrastructure, a suitable mechanism for lowering financing cost, reducing carbon emissions, and resulting in a positive market reaction. Certified green bonds often lead to the enhancement of BYD’s ESG ratings, increasing investment rate and trust, and ensuring its alignment with China’s “Dual Carbon” goals. The research findings reflect that green bonds could effectively manage climate risks while delivering financing benefits to investors and maintaining a cleaner environment.

Therefore, to encourage the expansion of Green bond usage in the Canadian market, policymakers should adopt stronger regulations to prevent greenwashing, such as mandatory third-party certification demonstrated in the EU’s 2023 Green Bond Regulations. Following the report and extensive research on BYD, technological corpora-

tions should invest more in transparency, especially in reporting bond proceeds, to ensure trust and confidence between the company and the investors or stakeholders. The Canadian automotive industry should incorporate BYD’s knowledge on issuing green bonds to fund its electric vehicle production and renewable energy projects to fulfill its expectations. While conducting future research, it should aim to explore the long-term environmental impacts of green bonds and their scalability in smaller markets such as the Canadian market. Nonetheless, by fostering and ensuring alignment with the global climate goals, Canadian industry can comfortably reduce economic risk while promoting its industrial sustainable growth.

References

- [1] Shi J. Report: Green bonds flying in China. China Daily, 2022.
- [2] Fatica S, Panzica R. Green bonds as a tool against climate change?. *Business Strategy and the Environment*, 2021, 30(5): 2688-2701.
- [3] Flammer C. Corporate green bonds. *Journal of Financial Economics*, 2021, 142(2): 499-516.
- [4] Shishlov I, Morel R, Cochran I. Beyond transparency: unlocking the full potential of green bonds. *Institute for Climate Economics*, 2016, 14(8): 1-28.
- [5] Zhenwei Qiang C, Jun Xu C, Purdy A. Floods slowed China’s factory activity in August. *Asian Times*, 2020.
- [6] Zhao B, Yarime M. The impacts of carbon tariffs on international trade flows and carbon emissions: An analysis integrating trade elasticities with an application to US-China trade. *Energy Economics*, 2022, 115(6): 106-133.
- [7] Liu L, Wang X, Wang Z. Recent progress and emerging strategies for carbon peak and carbon neutrality in China. *Greenhouse Gases: Science and Technology*, 2023, 13(5): 732-759.
- [8] Lib Q L X. Analysis of Investment Value in China’s New Energy Vehicle Industry-Taking BYD Company as an Example. *Journal of Advanced Academic Research and Studies*, 2024, 1(4): 1-17.
- [9] Zhang Y. Do green bonds increase “greenwashing” behaviour in corporate green innovation?. *Journal of Sustainable Finance*, 2024, 5(2): 88-102.
- [10] Yuan Y. Exploring the dual impact of green bond issuance on corporate financial performance and environmental performance – The case of BYD. *Highlights in Business, Economics and Management*, 2024, 46(2): 233-239.